III. DESCRIPTION OF THE REPORTING PROGRAM

In designing a reporting program for California, PBGH and OSHPD worked to ensure that the program was clinically and statistically sound, and administratively feasible for hospitals to participate. PBGH and OSHPD began the formal process of implementing CCMRP in the Fall of 1996.

CCMRP Technical Advisory Panel

At the start of the project, PBGH and OSHPD assembled an advisory panel to provide guidance on the design of technical aspects of the program. During the course of the project, the technical advisory panel met periodically to discuss the outcome measure, purpose of the reporting program, selection of data elements, need for training of hospital staff and auditing of data to ensure data quality. In addition, the advisory panel reviewed and commented on the analysis plan, study findings, and the presentation of the results. The CCMRP Technical Advisory Panel is comprised of cardiac surgeons, cardiologists, and clinicians with expertise in quality of care and risk adjustment.

Review of Similar Programs

Prior to developing the structure of CCMRP, staff from PBGH and OSHPD reviewed the successes and problems experienced by the other major CABG surgical outcome reporting projects—including the New York State program, the Pennsylvania Cost Containment Council program, the Northern New England Cardiovascular Group, and the STS Cardiac Reporting Program. In addition to conducting an extensive review of the articles and documentation published by each project, staff talked with the research teams that produced the New York and Pennsylvania reports. Staff also examined the National Cardiac Surgery Database maintained by the STS and the Northern New England Program (O'Connor et al., 1991). This review revealed that most programs rely on the capture of detailed clinical information submitted directly by hospitals and physicians. Jollis and colleagues (1993) have suggested that using administrative data may result in not having the level of clinical data necessary to properly adjust for differences in pre-operative patient risk characteristics across hospitals. Appendix B describes several reporting programs operated by other states or organizations.

In structuring CCMRP, PBGH and OSHPD staff adopted a paradigm similar to the New York State Department of Health and STS programs. These systems have established a data collection system that is set up in the hospital or physician's office and focuses on capturing clinical data that identify the pre-operative condition of the patient (Hannan et al., 1994; Edwards et al., 1994). PBGH and OSHPD, with the recommendation of the CCMRP Technical Advisory Panel, decided to use data variables and definitions drawn from the STS reporting system to facilitate hospital participation.

Because the STS data collection software, risk-adjustment algorithm, and surgical results are proprietary and confidential, PBGH and OSHPD decided not to use the specific STS software and methods. An underlying tenet of CCMRP is that the risk-adjustment model will be publicly available for review and use by hospitals, researchers, and other interested individuals.

Additionally, the risk-adjusted hospital mortality rates will be made publicly available. Another difference between the approach used by the STS and CCMRP is that the STS uses a voluntary reporting system at the individual surgeon level, rather than at the hospital level.

Data Submission

To provide hospitals with flexibility and to avoid duplicating existing data collection systems, CCMRP allows participating hospitals to submit information in several different ways. For example, if a hospital or a hospital's surgeons use the STS system or their own system with compatible variable definitions (see Appendix A), the hospital can send data to CCMRP without having to re-enter their data into a separate software program. For institutions without any data collection system, CCMRP prepared a custom-written computer-based data collection instrument and provided this free-of-charge to any hospital that requested the software (Appendix C).

Selection of Data Elements

In defining the set of data elements for CCMRP, staff reviewed the clinical literature on risk predictors for bypass surgery (see Reference section for list of key articles) and examined variables collected by the leading cardiac reporting programs. In reviewing existing systems, staff listed the common variables used in each system as a means of determining whether there was consensus across existing reporting programs regarding the most important variables. A key finding of the literature review is that only a very small set of pre-operative variables accounts for most of what is explainable (in terms of a patient's pre-operative risk) for short-term CABG mortality.

Additionally, staff reviewed a consensus statement prepared by a panel of researchers from the major CABG reporting programs including the STS, the New York State Department of Health, the Northern New England Cardiovascular consortium, the Parsonnet group, and the Veterans Affairs group (Jones et al., 1996). The consensus statement examined the relative contribution of key variables collected by the various programs to adjust for differences in the severity of illness of patients across institutions. This consensus statement identified seven "core" pre-operative variables that were unequivocally related to mortality. Additionally, the Jones research team identified 13 "Level 1" variables that are likely to have a relationship and are suggested for inclusion, and 24 "Level 2" variables not clearly shown to relate directly to short-term CABG mortality, but which hold potential research or administrative interest. A list of the consensus statement variables is included in Appendix D.

Between the literature review and consensus statement, PBGH and OSHPD staff identified the universe of variables that experts were likely to be interested in, as well as an indication of the relative importance of those variables. Staff presented this information to CCMRP Technical Advisory Panel for its review, discussion, and recommendation on the final set of variables for inclusion in CCMRP. The Advisory Panel recommended collection of all "core" and "Level 1" variables, and the majority of "Level 2" variables, as identified in the review by Jones et al. Table 1 contains the list of 41 data elements collected by CCMRP. Not all data elements collected by CCMRP represent pre-operative risk factors of the patient.

Table 1: CCMRP Data Elements*

1. Date of Surgery	22. Interval (PTCA-Surgery)—(<6hrs or >6hrs)
2. Gender (STS: Sex)	23. Chronic Obstructive Pulmonary Disease (Yes/No)
3. Date of Birth	24. Congestive Heart Failure (Yes/No)
4. Race/Ethnicity (STS: Race)	25. Angina (Yes/No)
5. Insurer—Payment Source	26. Unstable Angina (Yes/No) (STS: Angina Type: Stable/Unstable)
6. Patient's Zip Code	27. NYHA CHF Class
7 Height	28. CCS Angina Class
8. Weight	29. Acuity (Elective/Urgent/Emergent/Salvage)
9. Pre-operative Creatinine (STS: Highest Serum Creatinine)	30. Ejection Fraction (%)
10. Hypertension (Yes/No)	31. Method of Measuring Ejection Fraction (LV Gram/Radionuclide/Echocardiogram)
11. Dialysis (Yes/No)	32. Left Main Stenosis (%)
12. Diabetes (Yes/No)	33. Coronary Disease—Number of Vessels (None/Single/Double/Triple)
13. Peripheral Vascular Disease (Yes/No)	34. Mitral Insufficiency (Regurgitation)
14. Cerebrovascular Disease (Yes/No)	35. Cross Clamp Time
15. Ventricular Arrhythmia (Yes/No)	36. Perfusion Time
16. Myocardial Infarction (MI) (Yes/No)	37. Internal Mammary Artery (IMA) Used (Yes/No)
17. Date/Time of Most Recent MI (STS: MI When, <6 hrs,<24hrs, 1-7 days, 7-21 days, >21 days)	38. Cardioplegia (Yes/No)
18. Number of Prior Heart Operations (Requiring Cardiopulmonary Bypass)	39. Date of Discharge
19. Date of Most Recent Cardiac Operation (STS: Previous CV Intervention: Most Recent)	40. Patient Status at Discharge
20. Number of Prior PTCA's	41. Date of Death
21. PTCA/Atherectomy on current admission (STS: During the Same Admission as Surgery)	

**Appendix A defines each data element.*